Team Achievement Award—Seabed Classification

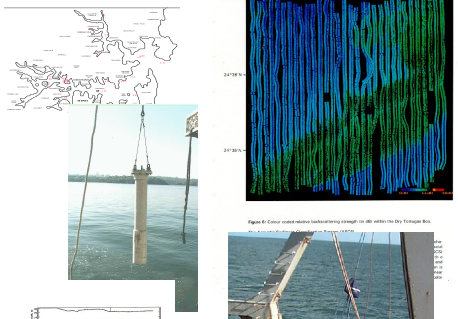
MAR TP-13 Mine Warfare and HF Acoustics

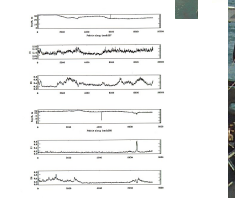
Recognised scientists

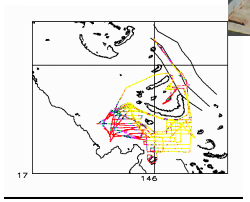
AS, Phil Mulhearn DSTO CA, Roland Poeckhert and Jon Preston DREA

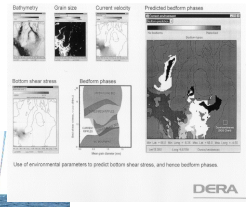
NZ, Bob Hurst DOTSE UK, Gary Heald and Kevin Murphy DERA

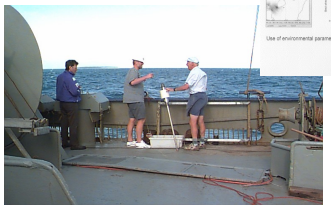
USA, Sam Tooma and Dan Lott NRL (Stennis)











- Buried sea mines cannot be detected using existing minehunting sonars. The mine countermeasures Commander needs a prediction capability coupled with a measurement capability in the field to allow him to deploy alternative countermeasures such as influence sweeping. The provision of such an in stride capability was the focus for this TP13 collaborative activity.
- Current systems require inputs which could only be taken from historical charts or measured by sending down divers or by taking core samples. The aim of this work was to demonstrate techniques to make these measurements remotely or in stride.
- AS, CA, NZ, UK and US participated in a major programme of research over a 4 year period to develop, demonstrate and characterise:
  - four acoustic methods of seabed classification
  - five unique seabed penetrometers
- This programme involved joint equipment development, a sequence of six sea trials, data analysis and reporting with the majority of the 24 technical reports being generated collaboratively. With the development of remote and in stride determinations of sediment characteristics, mine burial probability can now be calculated using burial models developed by TP13 and MCM tactics continually optimized relative to dealing with the buried mine threat;
  - This knowledge of the buried mine threat will lead to more successful MCM operations such as amphibious landings, yielding MCM operations that can be conducted more quickly and more safely, perhaps leading to the saving of many human lives;
  - We now have confidence in our ability to determine sediment types and properties using acoustic seabed classifiers for remote and in stride measurements rather than unreliable historical information or time consuming diver assessments;
  - We can use the sediment information to estimate the sediment properties needed for predicting mine burial upon impact and due to scour. This data can also be used in sonar performance prediction models, thereby improving their capability;
  - We have established designs and can use seabed penetrometers to periodically provide “ground truth” sediment strength data for calibrating the seafloor classification systems;
- The most important advancement in technology has been the significant improvement in the state-of-the-art in small seabed penetrometers used for providing a measure of the sediment strength at the sampling point. In addition, the understanding of seabed/acoustic interactions has been significantly increased and has led to algorithm developments which predict the sediment properties with a high degree of confidence.
- Shared design and development cost of the seabed penetrometer, shared the research, evaluation and development cost of acoustic seabed classifiers and share trials have made savings estimated at over $8m.